

# **Trident Laser User Facility**

*Los Alamos National Laboratory*

## **Governance Plan**

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## **TRIDENT Laser User Facility**

### **Governance Plan**

#### **1. Introduction**

The TRIDENT Laser Facility at Los Alamos National Laboratory is a User Facility for basic and applied research in High Energy Density Laboratory Plasmas (HEDLP) operated by the Department of Energy's (DOE) National Nuclear Security Administration (NNSA), and is managed by the Plasma Physics group within Physics Division. The TRIDENT Laser consists of three high energy Nd:glass laser beams, which can be delivered to three independent target experimental areas. The target areas are equipped with an extensive suite of diagnostics well-suited for a broad range of HEDLP research in Relativistic Laser Matter Interactions, Nonlinear Optics of Plasmas, Dynamic Material Properties, Fast Ignition Science, Inertial Confinement Fusion Science, and other areas relevant to HEDLP. Specifically, Trident has two long-pulse beams, capable of delivering up to 250-J each at 527-nm with a pulse duration less than 5-ns pulse, or up to 1-kJ each at 1054-nm with a pulse duration less than 10- $\mu$ s. In addition, TRIDENT has a 200-TW Chirped Pulse Amplified (CPA) laser beam, with up to 100-J on target in a 500-fs pulse, with focal intensities exceeding  $10^{20}$  W/cm<sup>2</sup> on target. The TRIDENT laser system can be used to perform experiments with simultaneous long and short pulse beams, and is designed to operate on a 45-minute shot cycle.

Access to the User Facility is available to researchers from throughout the scientific community, including other National and Government Laboratories, academia, and industry. All work at TRIDENT follows a formal proposal process that includes a review for scientific merit, and a review for technical feasibility and safety.

The TRIDENT Governance Plan addresses the following issues:

- Define the user facility management, and the advisory and review committees that will be used for proposal solicitation, review, and allocation of time on TRIDENT.
- Define the systems that are in place to determine how USERS gain access to the TRIDENT User Facility
- Work Performance
- Reporting

## **2. TRIDENT User Facility Management**

### **2.1 TRIDENT Director**

The TRIDENT Director is responsible for defining the overall TRIDENT facility use, and will be accountable for the quality of work and for the management systems required to maintain a user community supporting both the programmatic and basic science missions of TRIDENT. It is the responsibility of the TRIDENT Director to develop and implement the governance plan, define the policies and procedures, and create the advisory and review committees that will be used for proposal solicitation and review, and for allocation of time on TRIDENT.

### **2.2 Scientific Advisory Committee**

The Scientific Advisory Committee (SAC) is composed of mostly external scientists, and is chartered with evaluating scientific programs, providing advice on future scientific directions and infrastructure needs, evaluating user facility operations, and assuring that TRIDENT maintains a highly effective user program. Members of the SAC are appointed by the Physics Division Leader at LANL.

### **2.3 Proposal Review Committee**

The Proposal Review Committee (PRC) consists of scientific experts in areas relevant to the proposed TRIDENT work who are external to TRIDENT staff and management. The role of the PRC is to review proposals for scientific quality, merit, and impact on the field. PRC members will provide a spread in scores between highest and lowest rated proposals, thereby providing the basis for TRIDENT resource allocation. The results of the PRC ratings are used in conjunction with the technical feasibility and facility impact review by the TRIDENT Director to draft an experimental schedule. The TRIDENT Director will balance PRC recommendations with available resources and programmatic importance to decide which USER proposals will be scheduled. PRC members will recuse themselves from ranking any proposal for which a conflict of interest exists. Members are appointed to the PRC on a yearly basis by the TRIDENT Director, with recommendation by the SAC.

### **2.4 Facility Technical Advisory Committee**

The Facility Technical Advisory Committee (FTAC) is an *ad hoc* committee, chaired by the TRIDENT Director, and consisting of TRIDENT operations staff, and other LANL scientists. The role of the FAC is to review the experimental proposals for safety, technical feasibility, impact on facility, compatibility with TRIDENT capabilities and resources, and provide recommendations on scheduling. Members of the FTAC are selected by the TRIDENT Director.

### **2.5 TRIDENT Laser User Group**

A User Group will be formed for the TRIDENT Laser Facility. Membership in the TRIDENT Laser User Group is free, and is open to anyone who uses TRIDENT, seeks to use TRIDENT, or collaborates with TRIDENT users. The purpose of the User Group is

to facilitate and promote communications among users of TRIDENT, from the User Group to the TRIDENT facility, and from the users to the broader scientific community. Specifically, the User Group supplies a means for users of TRIDENT to communicate concerns and recommendations to TRIDENT management about operating policy, availability, facility infrastructure, and other matters affecting the user community. The User Group will nominate and elect a User Executive Committee (UEC) whose role will be to define the User Group Bylaws and Policies. The UEC will meet with the TRIDENT Director and Management *at least yearly* to communicate USER issues.

### **3. Proposal Process**

TRIDENT Users are a collection of successful applicants selected from proposals submitted from LANL, academic, government and industry research institutions. Users may be U.S. citizens or foreign nationals affiliated with domestic or international research institutions. TRIDENT Users request allocation of time on TRIDENT as part of the User Program through the proposal process, or through LANL Programmatic Use.

Up to 25% of available TRIDENT shot time will be allocated as LANL Programmatic Use for the LDRD program, NNSA programs, and other programmatic research. Approximately 70% of the shot time on TRIDENT will be allocated to the User Program, which includes Users from LANL, academia, government and industry research institutions. Up to 5% of the shot time is reserved, and will be allocated at the discretion of the TRIDENT Director.

Researchers submitting a proposal for LANL Programmatic Use on TRIDENT must submit a proposal by the appropriate deadline. LANL Programmatic Users proposals will be reviewed for Technical Feasibility and Safety by the FTAC. Scientific Merit Reviews for these proposals will be conducted by the appropriate LANL programmatic sponsors, and a notification of programmatic sponsorship will be submitted to the TRIDENT Director.

#### **3.1 Proposal Solicitation**

TRIDENT requires that all prospective USERS who wish to use TRIDENT submit a proposal through the TRIDENT proposal submission process. Prospective USERS are strongly encouraged to contact the relevant TRIDENT and LANL scientists to discuss their proposed research to determine if their proposal is feasible using the capabilities at TRIDENT. TRIDENT solicits proposals in the broadest practical manner including:

- A general call for USER proposal announcement
- A large e-mail listing generated through active requests from researchers
- Announcement at TRIDENT USER Workshops
- Listing on the TRIDENT Web site
- Advertisement by TRIDENT staff at professional meetings and workshops, and
- Direct contact from TRIDENT staff and management.

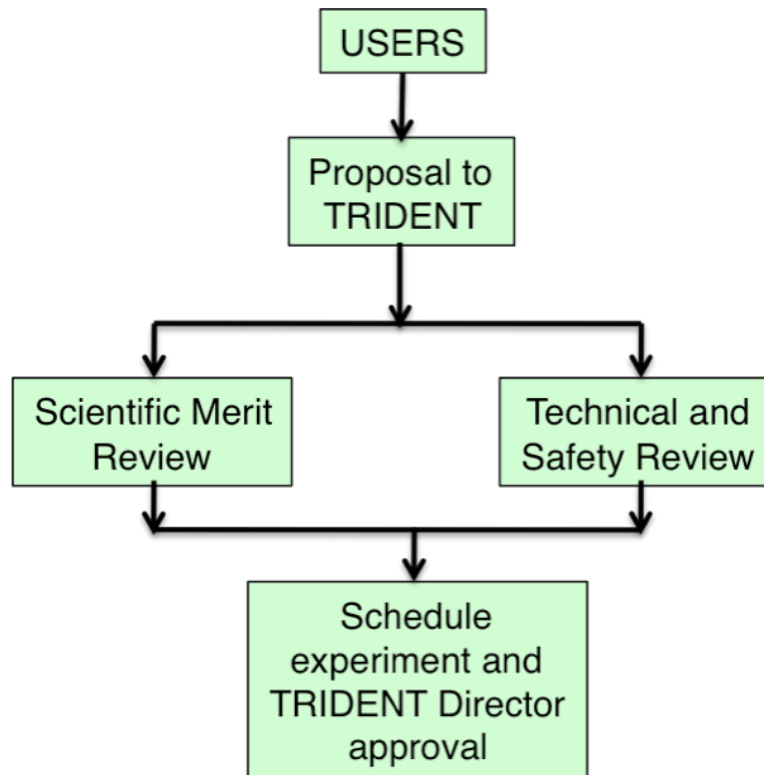
### 3.2 Proposal Evaluation, Selection and Scheduling

The TRIDENT proposal process to decide which User Program applications receive facility time consists of three elements. A flow diagram for this process is shown in Figure 1.

The first element is a technical feasibility, safety, and facility impact review. The Facility Technical Advisory Committee (FTAC) reviews the proposals, and comments on the practical feasibility, and ES&H aspects of the proposed work. Each proposal is assigned a YES/NO score from the FTAC. It is *strongly encouraged*, but not required, that prospective Users contact the relevant TRIDENT or LANL scientists prior to submitting a proposal to determine if their proposal is feasible using the capabilities at TRIDENT, and to discuss any potential ES&H concerns for their proposed research.

The second element is a scientific merit review of the TRIDENT User Program proposals. This review is conducted by the TRIDENT Proposal Review Committee (PRC), which consists of scientific experts in areas relevant to the proposed TRIDENT research who are external to TRIDENT staff and management. The principal review criteria will be scientific quality, merit, probability of success, and impact on the field. PRC members will provide a spread in scores between highest and lowest rated proposals thereby providing the basis for allocation of time on TRIDENT. These scientific merit reviews may be initiated prior to completion of the FAC Technical and Safety Review. The proposal ranking criteria are outlined in Appendix A.

The final element in the proposal process is the decision by the TRIDENT Director to allocate and schedule facility time for the experiments. The TRIDENT Director will balance the PRC ratings and FTAC recommendations with available resources and programmatic importance to allocate time. When the schedule is developed, it is approved by the TRIDENT Director, and disseminated to the Users, TRIDENT staff, and posted on the TRIDENT web site. The User Office makes contact with the individual Users to facilitate their visit. The User Office obtains required training records, arranges training, badging, DIVA approval (in the case of foreign nationals), computer access, etc.



**Figure 1** – TRIDENT User Interaction and Proposal Process flow diagram.

## 4.0 Work Performance and Reporting Requirements

### 4.1 Role of the Principal Investigator

The Principal Investigator (PI) is the individual responsible for proposing experiments to be conducted on TRIDENT, and is generally the lead investigator on the proposed work. The PI is responsible for interacting with the TRIDENT Director and TRIDENT User Office to coordinate the visit of the experimental team, to coordinate experimental, diagnostic and laser requirements, and to monitor the successful execution of the experiment. To avoid potential confusion, a single point-of-contact must be identified, either the PI or their designee, to communicate with TRIDENT operations staff regarding laser and diagnostic settings during an experimental run.

It is the responsibility of the TRIDENT Person-in-Charge (PIC) to ensure that the work performed by the PI and Users is consistent with all Laboratory and TRIDENT requirements in terms of safety and compliance. At TRIDENT, there is a designated PIC for the Laser Area and the Target Area. The PIC is a TRIDENT Operations staff member who has formal responsibilities within the LANL Integrated Safety Management Program, and is authorized by LANL to stop any work by the PI and Users that is deemed unsafe, or that could lead to a violation of compliance. Likewise, all Users of TRIDENT have the ability and responsibility to issue a stop work order in unsafe situations.

Approximately 6 weeks prior to commencing the experiment, the PI or designee will conduct a comprehensive review of the detailed requirements for their upcoming experimental campaign on TRIDENT. This review is for the benefit of the TRIDENT staff and the experimental team involved with the targets, laser, and diagnostic systems. The review can be onsite at LANL, or can be conducted by video teleconference (VTC).

For *new users*, it is *strongly recommended* that the PI or their designee visit TRIDENT prior to the 6-week review for a tour of TRIDENT, and observation of operations.

For each shot day of the experimental campaign, the PI or designee will attend the Plan of the Day (PLOD) meeting. It is *strongly recommended* that all experimental team members attend the PLOD meeting each day. During execution of the experiment, the PI or designee will be the single point of contact with TRIDENT staff regarding any changes to laser requirements or diagnostics. If issues associated with safety (personnel or equipment) arise during an experimental sequence, the TRIDENT PIC can stop work until the safety issue can be adequately reviewed and resolved.

## 4.2 Reporting

After the experimental campaign has been completed, it is the responsibility of the PI to provide the TRIDENT Director or TRIDENT User Office with the following:

- last day of experiment – TRIDENT Experimental Evaluation Form. This is a written critique of experiment and facility performance.
- 1-week after experiment is completed – summary paragraph describing accomplishments during experimental run. This is *critical* for monthly reporting to TRIDENT funding sponsors. Inclusion of graphs or pictures for the summary paragraph is optional.
- 1-month after experiment is completed – 1 - 2 highlight viewgraphs (PowerPoint and PDF format) showing preliminary experimental results.
- 3-months after experiment is completed – a 1 – 3 page technical report suitable for a general technical audience (Word and PDF format). The report should motivate the experimental work, and describe its importance and impact on the field. The report must also contain pictures or graphics showing the main experimental results. The report will be included in the year-end TRIDENT facility report. It should include names and affiliations of all personnel associated with the experiment, as well as acknowledgement of funding sponsors.
- End of Calendar Year - the PI will notify the TRIDENT Director of publications, patents, honors, and awards resulting from experiments at TRIDENT. Publication authorship should reflect the contributions of TRIDENT and LANL collaborators as appropriate, based on guidelines provided by the National Academy of Sciences and the American Physical Society.



## Appendix A – Proposal Ranking Criteria

The ranking criteria endorsed by the International Union of Pure and Applied Physics will be used to review TRIDENT proposals, and include 1) Scientific Merit, 2) Technical Feasibility, 3) Capability of the Experimental Team, and 4) Availability of the Resources Required. In the review process, scientific merit will be paramount. To rank the proposals for scientific merit, the following scoring system is used by the PRC:

5 – Extraordinary - The proposal involves highly innovative research of great scientific importance. Proposed research will significantly advance knowledge in its scientific field, and publication in a high impact scientific journal (*Nature, Science, PRL*) is very likely. Considerable scientific impact is demonstrated. TRIDENT's capabilities are highly desirable for the success of the proposed work. The technical approach is truly innovative, and the effort will yield not only the desired results, but also possibly new discoveries. The PI is a well-recognized world leader in the field, and the team demonstrates broad strength in experiment and theory capable of taking the research to discovery class work.

4 – Excellent - The proposed research is of high quality and has potential for making an important contribution in its scientific field. The work is cutting edge and is likely to be published in a high impact scientific journal (*Nature, Science, PRL*). TRIDENT's capabilities are important to the success of the proposed work. Experiment utilizes an original application of an innovative approach. Effort will yield all of the desired results with no foreseeable problem. The PI is a well-recognized national leader in the field, and the team has significant demonstrated expertise to ensure success of the project.

3 – Good - The proposed research is original and likely to produce quality, publishable results in a specialty journal (*Phys. Plasmas, PRE, PRA, HEDP...*). Impact on its related scientific field is likely. The proposed work will greatly benefit from access to TRIDENT. Experiment proposes to use a reliable approach with well-articulated implementation, desired results are likely. The PI has demonstrated ability to lead a scientific team to success, team has established good level of expertise for proposed research.

2 – Fair - The proposed research is interesting but rather evolutionary, unlikely to deeply impact its related scientific field. Journal publication may or may not result from this research. The proposed work could be performed at facilities other than TRIDENT. Experiment proposes to use a reliable approach having potential difficulties in this context, desired results are possible. The PI has expertise and experience to lead a team, team has the minimal level of expertise to perform the research.

1 – Poor - The proposed research is not well planned, or is not feasible. Results would not make important contributions to fundamental or applied understanding, and work is not likely to result in Journal publication. The case for needing to perform the work at TRIDENT is not clear. Proposed technique is unsuitable or flawed, and it is unlikely that the desired results will be obtained. The PI is limited in scientific expertise and experience, the team has poor track record of research productivity or has insufficient expertise for fielding the experiment.